

#76024

Cruise Report

R/V ATLANTIC TWIN 76-2

DSRV NEKTON GAMMA

7 - 14 July 1976

D.W. Folger, U.S.G.S.  
Woods Hole, MA 02543

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Vessel: R/V ATLANTIC TWIN, Master - Van Horn

DSRV NEKTON GAMMA: Pilots - Slater, Parsons, and Czahara

Cruise No.: R/V ATLANTIC TWIN - 76-2; DSRV NEKTON GAMMA

Area: Middle Atlantic Continental Shelf (Baltimore Trough),  
U.S.G.S. Stations 4119 (Buoy site 113), Station 4115,  
Station 4114 (EB 41)

Ports: Woods Hole, MA - Atlantic City, N.J. - Cape May, N.J. -  
Woods Hole, MA

Date: 7-14 July 1976

Personnel:

U.S.G.S.

Folger, D. - Chief Scientist

Butman, B.

Shea, P.

Mihalik, M.

Consultant

Eliaison, A.

VIMS

Kraeuter, J.

Serafy, K.

Scientific and Navigation Equipment: Loran A,C; ATNAV System;

3 10 liter Niskin bottles; Filtration Equipment; 35 mm

cameras; XBT's.

Narrative:

7 July 76

2030 depart Woods Hole

8 July 76

2000 arrive Station 4119

Checked tripod transponder and pinger -  
operating. Anchored overnight.

9 July 1976

0815 launched sub (Dive 691) with Folger and Parsons  
at Buoy site 113,

0955 sub surfaced

1002 sub recovered

1140 tripod recovered using "A" frame and crane

1350 launched sub (Dive 692) with Serafy and Slater at  
Station 4119.

1448 sub surfaced

1452 sub recovered

1500 commence Niskin bottle water sampling -  
3 bottles

1520 launched sub (Dive 693) with Kraeuter and Czahara

1602 sub recovered

1615 steaming to Atlantic City

2340 arrive Atlantic City to pick up B. Butman

10 July 1976

0100 depart Atlantic City steaming for Station 4115

0830 arrive Station 4115

0940 launched sub (Dive 694) with Butman and Parsons at  
Station 4115 to survey tripod and buoy mooring

1015 commence Niskin bottle water sampling - 3 bottles

10 July 1976

1225 launched sub (Dive 695) with Folger and Slater  
at Station 4115 to survey tripod

1410 sub recovered

1440 launched sub (Dive 696) with Serafy and Czahara at  
Station 4115 for biological survey

1612 sub recovered

1740 launched sub (Dive 697) with Slater and Zahara to  
attach line to tripod

1815 sub recovered

1930 tripod recovered

2000 anchored for night

11 July 1976

0615 launched XBT

0800 arrived at Station 4114 and listened for  
pinger - no signal

1000 deployed transponders near MET buoy  
wind increasing, rain - no diving  
dragger nearly picked up transponder

1300 surveyed transponder net

1440 began retrieving transponders -  
one did not release

1730 left transponder to steam to Cape May

1800 XBT measurements every hour until arrival  
in Cape May

12 July 1976

0105 arrived Cape May to offload B. Butman and  
take on fresh water

0230 depart Cape May for Station 4114

0935 arrive Station 4114  
wind 15-20 NW - moderate chop -  
no diving

1157 collected Niskin bottle water samples-  
3 bottles along with XBT measurement

1300 commenced grappling for transponder

1304 lost transducer

1736 transponder recovered

1940 underway to area of 4119

2355 hove to near Station 4119  
winds 30-35 kts NW

13 July 76

About 800 commenced steaming for Woods Hole

14 July 76

About 0900 arrive Woods Hole

## Daily Log

R/V ATLANTIC TWIN

Date 1976 Day

Position - Area of Activities

8 JULY THU.

N.Y., N.J. OFFSHORE

Charter Party G.O. (USGS) 7

Crew WWH TS JR LR RS

Activities NEKTON GAMMA SUPPORT

0600 OVERST

Temp.

68

Baro.

30.1 ✓

Tide

Wind

SW 10-20

Time

enroute Dive site - 235m

0645

increased speed - 5ms 3-5 SW

2000

ON site - Buoy location 39°25.5'N 73°01.5'W

SEARCHED AREA FOR TRANSponders

2200

Anchored - 1/2 mi NW of Buoy-

Break

13

Lunch

13

Dinner

13

Hours Operated

24

## Daily Log

R/V ATLANTIC TWIN

Date	Day	Position - Area of Activities
July 76	FRI	39° 27.6 N 73° 02 W
Charter Party G-0 (USGS) 8		

Crew WVH-TS JR LR RZ

Activities NEXTON GAMMA SUPPORT

Jersey Coastal Sites

Weather	Temp.	Baro.	Tide	Wind
CRIST	68		3 mi.	SW 5-10

Time	Activities
	Anchored 1/2 m. NE of Site BUOY
0700	Breakfast. Turn To
0730	weighed anchor. Toggling To Buoyed dive site
0817	Sub away from buoy site - 344 - 4389 345: 2783
0814	Sub on hip - location as above -
	Rigged A Frame + Crane for Tripod PU Sub on board
1350	Sub away - 39° 27.6 N 73° 01 W 344.4393, 345 2790
1458	Sub on Hip. Terminated Dive at 344-4991. 345 2796
1520	Sub away. 344: 4390 345: 2790
1602	Sub on Hip - 4391 345: 2789
1620	Sub aboard. Underway - Atlantic City 280°C
2345	Stars - <del>Reel</del> ATLANTIC City

Break	Lunch	Dinner	Hours Operated
13	13	13	24



## Daily Log

R/V ATLANTIC TWIN

Date 1976 Day Position - Area of Activities

Charter Party

C.O. (USGS) 10

Crew

Activities

Weather Partly

Temp:

Baro.

Tide

Wind

Time

Part of 1976 ATLANTIC CT

0100 Underway - 153° m from Abasco Sea buoy

0340 Changed Course To 146°

0815 on station 38° 33' N 73° 30' W 344-365, 345-2868

1145 Sub away at buoy -

1234 Sub on hip - 200 yds N.E. of Buoy (Tripod)

1300 Sub away - Tripod still

1406 ~~1434~~ Sub on hip -

1434 Sub away 150 yds south of station buoy

1612 Sub on hip - 1/2 mi. W. of buoy

Tripod release failed - rigged sub for recovery

1740 Sub away

1815 Sub alongside - loading aboard

1930 Tripod on deck - secured for dinner

2015 Anchored

On anchor watch

Break

13

Lunch

13

Dinner

13

Hours Operated

21

## Daily Log

R/V ATLANTIC TWIN

Date	Day	Position - Area of Activities
11 JULY SUN		Offshore - NJ 38°33' N 73°30' W
Charter Party C.R.O. (USGS) 10		

Crew WWH TS JR LR RZ

Activities NEKTON GAMMA SUPPORT

0600 overcast Weather Temp. 74° Baro. 30.15 ↓ Tide Wind SW 15-25

Time	Anchored at Dive site 4115			
0530	weighed anchor.			
0800	on station - Buoy 1140 354°C 344-3710 300-2900			
	Run + MANA REC - retrieve pingers			
1440	Running navigational Transsects - Seas 3-5' WIND SW 25			
1730	Began retrieving NAV. TRANSDUCERS			
1800	Underway - Caps MAX - 2916°C			
1900	Position - 3H4 = 2940		3H5 - 3727	
1920	Pos. 3H4 = 3690		3H5 - 2993	
20:00	y/c 292°			
21:00	Pos - 3H4 3644		3H5 - 3035	
2200	Pos - 3H4 - 3606		3H5 - 3073	
	3H4 3566		3H5 3115	
	</			

## Daily Log

R/V ATLANTIC TWIN

Date <sup>1976</sup> 12 July Day Mon Position - Area of Activities Cape May - Offshore

Charter Party G.O. (USGS) 10

Crew WKH TS RZ JR LR

Activities NEKTON GAMMA Support

Weather

Temp.

Baro.

Tide

Wind

Time

In route from Diver site to Discharge ~~Site~~ Scientist

0105

Dockside - C.G. Base - Cape May, N.J.

Took ON 1300 Gal Water

0230

Underway - 114° C

0935

ON SITE - E Buoy -

Weather not within limits for diving - set back

for grapple attempt on Sea Link Transponder

1304

lost Transducer. 344-3767 345-2906

105° M .9 mi from E Buoy - Grappled for Transponder

1730

Picked up Transponder

1940

underway - 075° M

2355

Home To Near Station - Winds NW 30-35

Break

14

Lunch

14

Dinner

14

Hours Operated 44

30 kW = 60

60 kW = 36

MAINS = 82

# Operational Summary

ATLANTIC TWIN - NEKTON GAMMA

7-14 July 1976

Sta./Dive #	Date	Locations		Loran (A) (C)	Time		Water ΔT Depth	Observer	Pilot	Notes
		Lat.	Long.		Down	Up				
Moor. 113	9 July 76	39°25.5'N	73°00.5'W	39940 70242 (C)	0817	1002	105 66	Folger	Parsons	Documented tripod operation on the bottom.
4119 692	"	39°27.6'N	73°01.0'W	4393 2790 (A)	1350	1448	58 64	Serafy	Slater	Biology survey.
4119 693	"	"	"	4390 2790 (A)	1520	1602	42 64	Kraeuter	Czahara	Biology survey.
4115 694	10 July 76	38°33.3'N	73°30.8'N	3695 2868 (A)	0940	1225	2:45 79	Butman	Parsons	Documented tripod operation on the bottom.
4115 695	"	38°33'N	73°30.8'W	"	1300	1410	1:10 79	Folger	Slater	"
4115 696	"	"	"	"	1440	1612	1:32 79	Serafy	Czahara	Biology survey.
4115 697	"	"	"	"	1740	1815	35 79	Czahara	Slater	Attach line to tripod.

Sample Inventory  
ATLANTIC TWIN 76-2 - NEKTON GAMMA

Sta.	Date	Time	Location		Data	Custodian
			Lat.	Long.		
4119	9 July 76	1500	39°27.6'N	73°02.0'W	1 Niskin Cast 3 Suspended Matter Samples	Bothner
4115	10 July 76	1015	38°33.3'N	73°30.8'W	1 Niskin Cast 3 Suspended Matter Samples	"
4114	12 July 76	1157	38°42.5'N	73°38.0'W	1 Niskin Cast 3 Suspended Matter Samples	"
4115	10 July 76	0615	38°33.3'N	73°30.8'W	1 XBT	Butman
4114	11 July 76	1800- 2400	on track between - 38°33.3'N 73°30.8'W and Cape May		6 XBT's	"
4114	12 July 76	1157	38°42.5'N	73°38.0'W	1 XBT	"

## Discussion

The purposes of this cruise were to 1. survey the geologic and biologic conditions around the pipes and railroad wheels set in June, 1975; 2. inspect the fully instrumented tripods in operation on the bottom prior to recovering them; 3. survey the COST drill site; 4. make a downslope traverse near the shelf edge where Conservation Division seismic data suggested possible bottom instability.

Due to continuously poor weather only two of the four objectives were in part or fully completed. The geology-biology surveys were carried out, though the two pipes were not located; the tripod functions were fully documented on the bottom.

At Station 4119 the tripod survey revealed that lake or eel pout interfere both with the sediment traps and the current meters. Each sediment trap contained an eel pout; thus screens either will be needed or the traps should be abandoned as a useful device. One eel pout was curled up in a current meter rotor vane but did not stop it from rotating. Other hake were in the current direction vane cage but were almost always oriented into the current. Thus they were inhibiting short time variations in vane orientation. All other systems appeared to be operating normally. Biology at Station 4119 appeared to be similar to the previous year.

At Station 4115 examination of the tripod revealed a similar situation to that observed at Station 4119 - interference, mainly by hake, with the current meters. Geologic and biologic conditions were similar on the bottom to those observed in 1975.

Bad weather (high winds and sea) precluded subsequent diving. Thus,

no observations could be made at Station 4114 where the pipe was surveyed in 1975.

Both tripods were recovered in excellent condition.

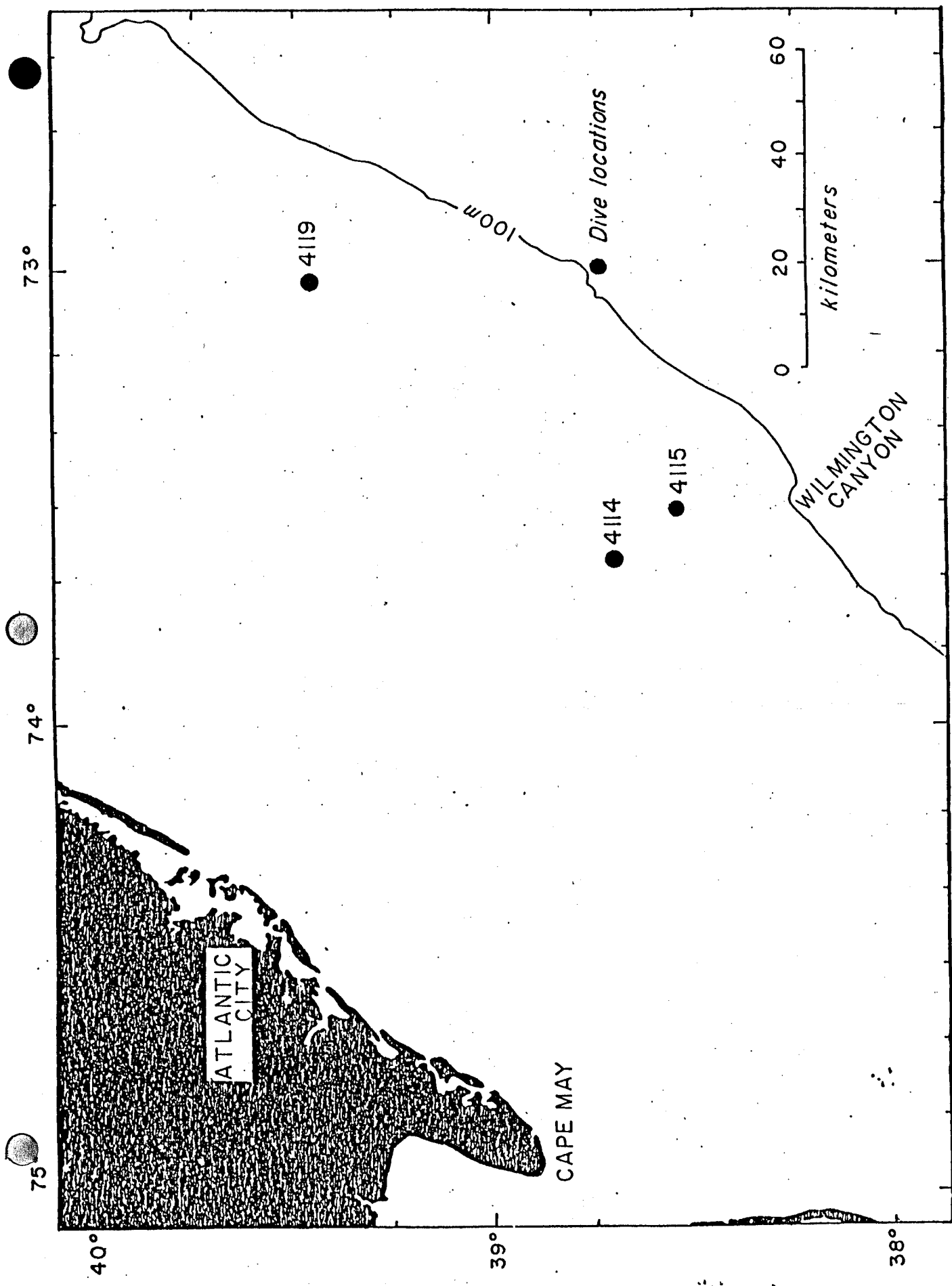


FIGURE 1. DIVE LOCATIONS



July 9, 1976 Dive #691 Mooring 113 Observer: Folger Pilot: Parsons

ATLANTIC TWIN 76-2 mooring site 113 - very close to station 119 - 9 July 1976 - 0815 preparing to launch. Surface temperature appears to be about 22.5°C. Commencing descent at 0817 - depth 50' - temperature 22.3°; 80' - 15.0°C; 100' - 14°C; fluctuating rather wildly here - it dropped to about 13.8°C at 100'; descending very rapidly - 150' - 10.2°C, good strong thermocline. Depth 160' - 8.6°C; 185' - 8.2°C (make sure we don't sit down on top of the tripod) 200' - 7.2°C - there's the bottom - suspended matter is quite heavy here at the bottom; on bottom at exactly 0820 - depth 218' - temperature 7.2°C. The bottom is very hummocky; some remnants of ripple marks. Heading is 145° - I can just see some traces of symmetric ripple marks that are almost destroyed lying at approximately right angles to our heading. Current is moving 130° - very slow - the velocity is 4 cm/sec based on 4 counts of particles passing the port. Most of the bottom is covered with hummocks, small hummocks; and they have pretty well destroyed the ripple mark pattern. The sand, fine light gray sand is covered by dark brown fluffy layer that covers 60-80% of the bottom. In the little hummocks some of it has been removed. Arrow worms are extremely abundant down here at this bottom interface. Shell debris is pretty small; fairly fine with a few large shells and it's scattered not abundant; small scallop in an enormous hole here; I'll take a few pictures of it - first shot of the day - on the bottom was a scallop in a hole out the forward port - so it may not be too clear. Scallops are on the move down here - we should get some pretty good shots of them; there are some peculiar abundant red sand dollars. Scallops are very common - small ray. We are now on a traverse - it is 0825 - to find the tripod. Visibility is not too good down here - it is about 5 m - lot of fine shell debris - scallops are relatively small here - in relation to

the ones we saw up north - but very active - they are all flying as we come by - I'll try a little television if I can catch one. Starting some television now - this is ATLANTIC TWIN 76-2 - NEKTON GAMMA - on station 4119 - mooring 113 - shooting out the windows now to get a few shots - the arrow worms are very clear in the foreground here - the bottom is hummocky - occasional trace of well rounded ripple marks - moderately abundant scallops. There goes a moving scallop. We are now trying to traverse - we seem to have caught the station buoy using bursts of high power to try and clear the line from the station buoy. Ah, here comes some more moving scallops around us - They're all quite active down here - there's a good scallop population - even though small ones - they seem to make deep holes. We are steaming again now for the tripod - it is certainly a good evidence of a lot of biogenic activity down here - the shells are pretty well ground up, and the hummocks are ubiquitous - I'll take a few black and whites - okay, now taking a number of colored shots of scallops going by - may or may not show. Time 0840 - still on traverse for the tripod - few crabs down here - we have tripod in sight. Cal, don't stir up too much stuff, got sediment traps on the side - if we can, get on the down current side of those that will be good - they are oblong cylinders - they go up along side one leg. We are in the neighborhood of the tripod right now; several big red hake right in the area. Doesn't that look good, it is pretty well planted. Turn a little bit to the left to take a few shots. Everything looks perfect - the interesting thing about it is the depth to which the two feet have been buried - there is a very large mound around them. They appear to be set just about 6 inches below the normal level - I don't know if that is impact when they hit or not. There is something living in that upper sediment trap. It looks like an animal living in the sediment trap. I don't know what it is - it could certainly screw up the measurements. The upper current rotor is turning freely - the

lower current rotor is not. I'll be damned - look at that - can you see the red hake up in the cage? Red hake in the upper current meter direction cage - obviously stopping any motion of that blade - the lower white blade looks all right. But the red blade has got a hake living right in the cage and is clearly fouling things up. The benthos current meter at the bottom looks very free and good and it agrees with the lower white vane, but it won't agree with that upper one - this is going to be quite interesting. I'll start taking some television of it, then I'll take some photos of it. This is at the tripod, site 113 near station 119; we are now shooting along it; you can easily see the sediment traps and perhaps off in the distance the current meter; the large moat you may be able to see over there; I am shooting blind, because of the angle I need. Take her up a good little bit so I can get those current meter changes in if you can - yeah - I think I ought to be getting those, the lower current meter cage is not working at all - upper is moving very nicely. I see what is stopping it, there is a hake wrapped right around the upper part of the rotor - how about that, we are going to have to put screens around those, okay, let's take some stills. Look at the size of the hake in the upper rotor - that is an enormous hake. It looks like an eel pout in the lower one - taking pictures - going to sit and document it - will be worth it - I'll shoot a bunch of black and whites then we will have to take time to change to color; seeing a lot of sand dollars and an awful lot of scallops; having problems with camera flashing - finally flashed - problems again - worked at the surface. Having a lot of problems this year with the photography, it's flashing; maybe we are getting some anyway, it is awfully bright out there. This is 400 ASA - we ought to get something - camera flashing now - maybe way over exposed. Now I'll change my setting and put the color in. That should

be a good one with that fish hanging out the edge - working fine now, what do you make of that. Now they are both gone - will try another setting - it's working perfectly now. These black and whites we ought to be able to tune up no matter how dark they are. There is a fish in every sediment trap. Okay, new roll of color film. I think I can get a shot right down in the sediment trap. There is an eel pout right in the trap; we'll get a shot of him, that is the eel pout's mouth, now he has decided to come out and look at me to see what is going on. Now the fish is back right in the rotor - he is riding around in the rotor - we have got to get T.V. of that - would be outstanding. I'll get some shots of that eel pout going round and round in that rotor; okay we are on the air again, the alignment is good between the current meters and the benthos outfit. The upper vane of the upper current meter is now jammed with an eel pout or a big hake; the lower vane of the upper meter is now jammed or - actually an eel pout is riding around inside it - he's just staying in it, seems to be rotating all right, but how it affects the measurements is another question. We are taking up a whole roll I think. There is quite a large moat around each of the tripod weights as if it hit the bottom pretty hard; it looks like a normal pile up of stuff, but there are many hake around each leg base so it may be related to their activities. They may be lying in there right along side of it and actually cleaned that material out, it is hard to say. It would be interesting to see the tripod immediately after it was set down. This phenomenon of the animals living in the traps is obvious, there is no question about what is happening. We obviously need screens over the trap tops to make these effective - probably a fairly coarse screen would do it; but the eel pout are happily curled up in each of the sediment traps. Having trouble with camera strobe. We are still trying to shoot the hake with T.V.; I'm afraid this won't come out,

still too much light - still getting a terrible bloom now can't see anything. Let's try the meters, maybe I can get them from here, may still have to try and take T.V. here all up and down this current meter. Take this remotely too. Get my head down - all scrunched up. That ought to be good. The hake just came around. You can see that in current meter a savonius rotor turning and the eel pout lying right inside that upper part of the rotor. Right up above it you should be able to see large hake. Upper hake is enormous. The wires going to the central column of current meters are in fair vibration - they are moving the whole current meter array. Perhaps it's a good thing - keeps everything moving just a little bit. It certainly doesn't keep the hake and the fish and so on out of it. In fact, it looks like all those cages are going to have to have more bars to keep those fish out. When we have been watching the upper meter has stopped or the lower meter has started again all right. Everything is clear on the lower meter where we are. I imagine as soon as we leave, it will be jammed up again. The flash bulb looks very clear; doesn't seem to be any fouling. The camera seems to be clear. Everything looks to be not covered with much material, looks very good. That eel pout living in the upper part of that meter is quite a sight - he's just going for the ride. The huge red hake is sitting very comfortably in the upper part of the meter. Okay, now I'll take a little video around the whole operation here. We are getting some television now all around the tripod - a good bit to show the moat all around one of the legs; I think the animals may have done some scouring. It seems like a perfect touchdown - I don't see any drag marks around it at all. It looks like a bryozoan or some kind of growth on the manilla line. If we stay with the metal and non-organic substances, I think we will be better off. There goes a great big red hake, just went right into the cage of the lower current meter.

It is now 0957 and we are going up by the tripod. Oh, oh a star fish has taken up residence on my window. Just ran out of film. Everything on the top of the tripod looks good for release. It should be a good clean release. If it doesn't we'll come down to the sub and hook on to the top of the balls. It looks very good. I got several black and whites as we come up on it, they should be all right. Okay, we are ascending, it is now 1000 we'll now attempt to recover the tripod as soon as we get the sub on board. Okay, dive 691 concluded at 1002 9 July on the surface.

July 9, 1976    Dive #692    Station 4119    Observer; Serafy    Pilot: Slater

We're on the bottom at 210 feet Station 4119 somewhere between our benthic stations B2 and B4. There are several Aphrodita hastata (sea mouse), and Asterias. There is a slight current on the bottom about 1/4 of a knot out of the south. The first few feet just filming the bottom. The sand dollar Echinarachnius parma is all over. Strongylocentrotus droebachiensis (green sea urchin) is down here along with Asterias tanneri (red sea star). Scallops and all kinds of chaetognaths (arrow worms). This is really nice. There are some small cerianthid anemones. Is this what you thought it would look like (pilot)? Yes, we've looked at a lot of benthic photographs taken from the grab sampler, but we just see a small piece of the bottom. I've never seen anything walking around like this. There are a lot of small cerianthid anemones scattered about, roughly 6-8 inches apart. Oh, look at those depressions around the scallops. That's really neat. There is a red hake in a depression. There are lots of Asterias tanneri and A. vulgaris. There is a really large Cancer irroratus. There are several sea hares around here. Oh, there is another Strongylocentrotus. There is a flounder, very nice, very nice. Another flounder in a depression. There are a lot of scallop depressions around. There are those little chicken scratchings across the bottom that we see in our photograph all the time. We don't know what makes them. There's a scallop with a whole bunch of squid eggs and anemones and here's a little skate. More Strongylocentrotus on dead Placopecten shells. Just as soon as I take a picture, something goes by I wanted to photograph. Got him, a little skate. The bottom is pretty much the same isn't it (pilot). Yea, it's fairly homogeneous. There's a nice skate. Maybe I should try the video tape for a while. Ok, we're on station 4119 at 210 feet flying across the

bottom. The bottom is fairly homogeneous, primarily with Echinarachnius parma, a few Cancer irroratus, a number of Asterias, mostly tanneri, but a few vulgaris, an occasional Placopecten in a depression, several small skates. How do you turn this thing off? Ok, flying over the bottom again. Before the settings weren't exactly right. It should be a little clearer now. A few Placopecten swimming off the bottom and several sea hares. They look to be 2-3 inches long, but are probably the small common one we see in the trawl samples. It's really hard to look through this monitor and see what's going on outside. I don't want to spend too much time with this video tape because I don't think you will get too much definition. The T.V. always comes out better than you think it will (pilot). Does it? I'm sure it will look better on a big T.V. Ok, taking out roll 2 of movie film. There's got to be some way to standardize this filming. If we knew how much area it covered. There goes a scallop. Trying videotape again. I can't really distinguish any species through this monitor. All I can see is a sand dollar or starfish and by the time I look out the window it's gone. Beautiful anemones. Squids have layed their eggs on every spare piece of shell they could find. You want to use the mechanical arm (pilot)? Yea, that might be a neat thing to try. I scared up some little isopods and a small fish. Some worm tubes. I'd like to find one of those little mounds and dig one up. Tape ended approximately 10 minutes before the end of the dive.



July 9, 1976 Dive #693 Station 4119 Observer; Kraeuter Pilot; Czahara

Passing 50' water is brown. Looks like a lot of plankton. Very very turbid. There are a lot of copepods and chaetognaths in the water. Copepods and Chaetognaths in abundance in the water. Still very turbid. 100 (pilot). Over 100 feet. Still abundance of copepods and chaetognaths in the water. Chaetognaths seem more abundant. Turbidity is slightly less. Water temperature is 8°C. Just saw a nauplii larvae of a crustacean of some sort go by. Bottom coming up, still a lot of plankton in the water. Saw some squid eggs. There's a scallop (Placopecten magellanicus). Bottoms covered with a... ok. We're on the bottom about 200' still large numbers of arrow worms in the water. Temperature is 7.5°C. Bottom is a sand covered by a dark layer of finer material. Let's see. Generally there appear to be scallops, Echinarachnius, Asterias vulgaris and some cerianthid anemones, hermit crabs and an Asterias tanneri. The bottom is full of little hills and depressions caused by animal activity. There's a Cancer crab of some species. Scallops seem to be very active flitting around quite a bit. There's a couple of Cancer copulating. Scallop. --Pilot - what do you want to do just run around for a short while. Yes, just more slowly for a while. The dominant form here appears to be Echinarachnius followed by the cerianthid anemones. There are some Dichelopandalus and the asteroids follow in abundance. Some small hermit crabs - a nudibranch. The bottom is very hummocky - some depressions and ridges caused by the fauna are everywhere. A squid must have just taken off - I saw some squid ink. Large dorid type nudibranch. Arctica and Spisula shells both. Arctica appear to be much fresher and there are some squid eggs.

Dichelopandalus here seems to be more out in the open or in depressions rather than under things like they were at the last station (Georges Bank). There was a Nassarius triuitatus. A bunch of anemones that I can't identify but there's a Dichelopandalus right in front of it. There's a polychaete worm which protrudes a large fan through the holes in the sand. I don't recognize it. Strongylocentrotus hiding under a rock. There's quite a few Placopecten scattered around either in depressions or between mounds. Some are large, some small. Looks like a fairly good size distribution. The first 5 pictures will just be general pictures of the bottom showing a variety of features. There goes a Rajaeglanteria (clearnose skate). There's a Lunatia egg case - a fairly large Strongylocentrotus, another clearnose skate. It looks to me like the Asterias vulgaris outnumber the A. tanneri about 2-3 to 1. Another Strongylocentrotus, another pair of Cancer crabs mating. They are moving away from the submarine fairly rapidly for a Cancer crab. I've already seen a number of small Cancer which appear to be dead lying on the bottom. (These may have been shed exoskeletons.) There's a moderate sized one digging into the bottom. There's quite a few bodies here. A small eel pout. There's a ring anemone on a scallop shell. Just like a mushroom fairy ring. A 4 spot flounder lying on the bottom - a spotted hake - another. We are off the bottom. On the way up I attempted to take some pictures of the plankton. Copepods and Chaetognaths. There's a small hydromedusa of some sort. While we were on the bottom I tried to get a picture of one of the dorid nudibranchs, however, it was tumbling over the bottom and may be upside down in the picture. The general impression was that this area was not too dissimilar from Georges Bank although this area is more hummocky with many more signs of larger benthic fauna. More starfish, fewer cerianthid anemones. I think probably fewer hermit crabs -

fewer fish - more scallops. In general just more signs of infaunal life. We're on the surface now and I want to make note of a gastropod I hadn't put on the tape earlier. Solariella obscura. I saw one crawling over the bottom. Again the observation that there are many fewer fish here than on Georges Bank. One small fish I couldn't identify - I saw several of those. We were only down about 30 minutes as opposed 1 hour or more on Georges Bank dive. Some of the squid eggs may have been bands of nudibranch eggs.

July 10, 1976    Dive #695    Station 4119    Observer: Folger    Pilot: Slater

Surface temperature 23.5° and commencing our descent. We are on station 4119 and going down to survey the tripod prior to pulling it. At 10' temperature 23.5°C; 20' - 23.2°C; 30' - 22.9°C; 40' - 22.9°C; 50' - 22.8°C; 60' - 22.1°C; 70' - 21.5°C; an enormous break right then, a great barrier there - it went to 18° instantly; 80' - 16°C; wandering 16-17°C; 90' dropping right through 15°C rapidly, suspended matter very abundant; 100' - 13.6°C; 110' - 11.9°C; 120' - 11.2°C; water beginning to clear up; 130' - 10° even; 140' - 9.5°C; 150' - 9.0°C; 160' - 8.9°C; flocks are getting much closer, big soupy ones; 170' - 8.9°C; 180' - 8.5°C, make it 8.6°C; 190' - looks like 8.8°C; had a little inversion; 200' - 9.0°C; 8.9°C; is closer; 210' - 8.6°C; 8.8°C; 220' - 9.0°C; this is a little complicated temperature structure down here, 230' - 9.0°C; 240' - 9.2°C; 250' - bottom in sight - 9.3°C; bottom coming up, 260' - on the bottom at 9.3°C, time 1312, date 10 July. Commenced the descent about 1305. Visibility is superb. The bottom here is quite hummocky, not much evidence of ripple marks, general mottling, fine debris, many burrows, sand appears to be fine texture salt and pepper sand, many fine particles of white shells, many small hummocks about 4-5 cm across, 1-2 cm high. Current is flowing from the north, a few big hummocks, big depressions. We are now wandering around on the sonar search. Quite a number of star fish. Sonar not working right - I get the pinger, but its pinging all around, guess it's really close. There are some hake, visibility is excellent - must be at least 10 m; the white shell debris is much increased. Shells are generally concave upward - some very large quahog shells, large clam shells, and some large scallop shells. The majority of the small ones maybe 2 cm across. Now looking around for the tripods with the lights out. Visibility is excellent. There is a hake completely buried in the sand lying next to a shell - just his head sticking up - it is quite a picture. Moving

along, much more abundant shell debris down here than last year. First shot in this series is going to be a hake lying in the sand. A lot of these little red worms again, just like last year. Little red worms with the white mucousy tails. Also getting larger here on the depressions, more depressions than hummocks. Little filamentous worms all over the place. Just covers the bottom. The gray sand underlies the darker brown layer that covers about 50% of the bottom. The little red worms really cover the bottom similar to their distribution last year in this location. No ripple marks here at all, just artificial ones from the chain - they really are ridged up, quite interesting. I want to take a picture of these. There's the chain. What is that thing down to your right, that big purple thing. A bottle, no I don't know what it is, maybe it's just a rock; let's take a picture. (Trouble with the strobe - not flashing). Look at that little sea snake. This whole area is all moved and furrowed by our chain. Okay, we are just traversing along, the bottom dominated by hummocky topography. There's very fine worm tubes, a lot of juvenile flounder around. Suspended matter is very coarse - flocks about 1/2 cm across at least. Current flow is maybe 10 cm/sec. We just found a cable down here; it might have been associated with our heavier gear. Maybe we better go look at the other end of it. Very old rusty cable, thought it might be ours. Back on track again to the tripod. Very few scallops around, just a few, here comes one flying right at us; there are a lot of animals here I haven't seen before. We are coming up on the tripod now, time is 1336. I'll try to take some movies of it. The feet are buried; there's a hake - no there are three of them in the current meter. A great big hake is right in the meter assembly - we want to get some pictures of those, everything else looks intact. A lot of brown weed on manilla line, we are going to have to get that out of

there. Looks good - there's a 38 KHz Pinger, right on the loop. We just bumped into the tripod, we have got our line wrapped around it up above us. Now we are going to try and make an effort to get untangled - then we will get some movies of it. We are untangled now - we are going to come up and take some movies, right in those sediment traps, and then try to go along side and get movies of the hake inside the current meter. These are going to be good. I'll get on the movie camera, going to need all the lights we have. Maneuvering the sub to get pictures. Think we got a picture of a hake swimming right into it; it was good. Look at that big shark what a beauty; maybe they come down here to feed on the hake. Don't see anything in these traps, they look empty. There is supposed to be jars in there, but I don't see any. I think I see a jar in the middle one. But the lower one is gone. Maybe smashed that one. Think I'll get a shot here. No, no flash. I think I'll try some black and whites wide open. Shooting these black and white wide open at 1.8. Current is right out of the north according to our meter. I'm going to try and plug in to the strobe of this instrument. I think I'll reset the camera again. Now, maybe I've discovered the problem. Now I'll try this strobe again. Flashing - good - not flashing, batteries must be dead, or it takes a few minutes between shots. There's some kind of garbage sitting over here to my left, I can't tell what it is. I'll take some T.V. This is dive 685 on the tripod. The nephelometer just came on. Yeah, see it light up, every 3 minutes. Right on the tripod now. This is the base of the current meter column, the bottom vane current meter turning, notice the enormous hake perched in the middle of the cage. Fortunately right in line with the current. Everything seems to be all right. Well, let's see, I think we should try and shoot up some more black and white and then we will go.

What an army of hake. He's right back in again, he just loves it there.

We are leaving the bottom here at 1405. 250' - 9.1°C; 240' - 9.0°C;

230' - 8.9°C; very close to 9°; 220' - 8.9°C; 210' - 8.7°C; 200' - 8.7°C;

190' - 8.6°C; 180' - 8.6°C; 170' - 8.3°C; it's getting colder and colder

as we ascend, how about that, 160' - 8.2°; coming into a turbidity layer

right here, 160' in a turbidity layer, that's amazing; 150' - 8.0° and

declining 140' - 8.0°C; 130' - 7.8°C; starting to change now, 120' - 8.4°C;

110' - 8.6°C; 100' turbidity high, 9.2°C; beginning to come up very rapidly,

now we want to get closely spaced ones here, 90' - 10.2°C; 85' - 11.0°C;

80' - 11.0°C; 75' - 11.5°C; 70' - 12.0°C; 65' - 12.4°C; 60' - 13.0°C; 55' -

14.5°C; 50' - 15.2°C; 45' - 18°C; 40' - 18.9°C; 35' - 19.8°C; 30' - 21°C;

25' - 20.5°C; 20' - 21°C; 15' - 21.2°C; 10' - 21.5°C 5' - 21.6°C; surface

22.5°C. On the surface at 1412.

July 10, 1976      Dive #696      Station 4115      Observer; Serafy Pilot: Czahara

Going down on Folger's Station 4115, somewhere about 10 miles south of our benthic E-stations. We are going through a layer of ctenophores, probably Mnemiopsis, in the upper 35 feet. Still running into Mnemiopsis at 50 feet. Can you switch on the lights? They are on (pilot). Oh, they are? Passing through a cloudy region here. Passing 100 feet. Starting with picture number 3 on Station 4115. We're going through a layer of suspended matter but I can't make out what it is. A larvacean, I think; I've never seen one of those. The bottom is coming up. Astropecten (sea stars) are all over the place. It's Astropecten americanus and a bunch of those syllid worms with the red tails (possibly Typosyllis tegulum). We are on the bottom at 260 feet, visibility 15-20 feet. The actual visibility is much better than that, probably 40 feet if we had stronger lights. Did the strobe go off? No, it didn't (pilot). One minute of fiddling with strobe and it doesn't work. Ok, taking movies. Current is out of the south at about 1/4 knot. Pictures 3-6, the strobe did not work; picture 7, taken with sublights. There are some small top shells and a large number of Astropecten americanus. Well, not a large number, I'd say about  $1/m^2$ , roughly. Oh, there is a nice Leptasterias tenera (red sea-star), a small flat fish. There is a fairly large number of what appear to be Calliostoma bairdii (top shells), roughly one every 2-3  $m^2$ . There is quite a bit of hummocking in this area. A few depressions here and there. There's a Cancer irroratus in the distance. A large Cancer borealis just burrowing in the substrate. There is a fair number of Leptasterias tenera (sea star), fair number meaning one every 4-5  $m^2$ . Another fairly large Cancer in the distance. I haven't seen any Echinarachnius parma (sand dollar) yet. Is it possible to go any slower than this? Well, I am in slow speed (pilot). Yeah, that's a good way to do it. Most of the



Astropecten are on the surface, not feeding. Or if they are feeding, they are feeding on things near the surface, because usually Astropecten are found slightly buried feeding on infaunal bivalves. They ingest their prey whole, not like Asterias with suckers to slightly open the valves and evert their stomach. We just went over a neat bamboo worm about 6-7 inches long. Ah, a little galatheid crab, probably Munida iris. Ok, that's the end of movie roll number 5. There is still a substantial population of Astropecten americanus, still roughly  $1/m^2$ . Look at the Leptasterias tenera. Ah, we're going over a piece of rope. There are a few dead Ensis (razor clam) sticking up. A scallop just went flying by. Two dead Spisula solidissima (surf clam) shells and a dead Placopecten shell. There aren't nearly as many anemones, in fact hardly any anemones and what I do see are very small cerianthids. Look at that moon snail. It's a giant Polinices. Can we get a picture of that moon snail over there? Yeah, I'm heading over there (pilot). It's between the snail and the starfish (pilot). Squiggling in the dirt? I guess I didn't see it. I want to try to get a picture of this first. There is a nice Leptasterias tenera in the background. Did you get the moon snail (pilot)? Yeah. Oh, I see what you were talking about, it's a galatheid crab (Munida iris) crawling under that dead shell. Can you back up? Oh, we'll probably screw everything up if we put it in reverse. Yeah, it's a little galatheid crab underneath a dead shell. I think that's probably what you saw moving. No, it was just ahead of that starfish, there in that pointed shell; it looked like a little worm sticking out (pilot). There goes a spotted hake; got it. Now I'll get that galatheid. Beautiful. Got it. Come out, come out wherever you are. That's a boy. There, see that shell right in the window, that pointed one (pilot)? Yeah, that's a Calliostoma bairdii, a top shell.

That's what was flipping around (pilot). There's an Astropecten upside down. Two legs are on the substrate and three are in the water column. I wonder what he's doing. They aren't suspension feeders. There's another galatheid crab, another Cancer irroratus just out of the picture. We are going through a cloudy area, the water is getting dirty. By far the dominant organism is that syllid worm with the red tails. There are a few hydroids and a few cerianthid anemones, very few though. If you get a chance I would like to dig up some of those mounds that you see there with the mechanical arm. I'd like to see what's making them. The Astropecten americanus seem to be fairly evenly spaced, not clumped together. I think I'll try to take some videotape. I can't do much with this videotape. I can't make anything out. An occasional hydroid attached to dead shells and a lot of shell hash of Ensis. There is a Placopecten in the distance. I think I'll finish this roll off and shoot another roll off into the distance. We can push the ASA since there isn't enough light. On second thought I don't think they push the ASA for 8 mm. Can we just drift with the current since that will get the best pictures. Reloading film. I just took the filter off so that should give us more light. A Leptasterias tenera. Good shot. The sand here seems fairly coarse. You can stir it up very easily and then it quickly settles down. Ok, we're coming into an area with a lot more shell hash, a lot of dead Arctica shells, some galatheid crabs underneath them and a piece of Fucus tumbling across the bottom. I wonder what that is doing out here? Ah, that's the first Asterias forbesi I've seen on this dive, a lot of Leptasterias tenera, but mostly all Astropecten americanus. Now we are running into a few more A. forbesi. Some surface depressions are fairly large now, several feet apart and roughly 1 1/2 feet in diameter, but most of the depressions are small, about 6 inches in diameter. A few Astarte. A number of these Astropectens have lost some of their arms. Tape ends roughly 10-15 minutes before the end of the dive.